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ABSTRACT

To determine the effects of the television program, "Around the Bend" and the Related activities of the home visitor and mobile van teachers, the Appalachia Preschool Test (APT) was developed by the Appalachian Educational Laboratory. APT is used to supplement the standardized instruments being used to measure program performance. The test consists of four subtests and an experimental section: Part 1 deals with color naming, identifying body parts, and right-left discrimination; Part 2 (described in this report) is the basis for determining specific cognitive learning from the early childhood education curriculum; Parts 3 and 4 are Piaget-type, conservation of number and size tasks; Part 5 is an experimental subtest designed to measure understanding of cause and effect, logical classification and letter recognition. To measure the achievement of cognitive objectives Part 2 was given to 273 children in three treatment groups, and subsequently to a 60-child sample in a comparison group. Children who viewed only the television program and were not exposed to the home visitor and mobile van teachers scored significantly lower on the test. Results indicate that the home visitor, more than any other part of the program, has a great potential for influencing the child's behavior, especially if she can produce changes in the child's environment. A summary of AEL Early Childhood Education program is available as PS 004 889. (Author/AJ)

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ATTAINMENT OF COGNITIVE OBJECTIVES

Technical Report No. 3

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Division of Research and Evaluation
Appalachia Educational Laboratory
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ATTAINMENT OF COGNITIVE OBJECTIVES*

Introduction

The Appalachia Preschool Test was developed by AEL to supplement the standardized instruments which were being used to measure program performance. It consists of four subtests and an experimental section which was being considered for final inclusion in the test.

Part 1 of the APT comprises 16 questions dealing with color naming, identifying body parts, and right-left discrimination. It was not derived from specific program objectives and tended to be more of an introduction to the remainder of the test.

Part 2 of the instrument is described in the text of the following report, and is the basis for determining specific cognitive learning from the ECE curriculum.

Parts 3 and 4 of the APT are Piaget-type, conservation of number and size tasks which together comprise 15 items.

Part 5 is an experimental subtest which was designed to measure understanding of cause and effect, logical classification, and letter recognition. It was not included for the purposes of summative evaluation.

Part 2 of the APT is the only direct measure of cognitive tasks which have been included in the ECE curriculum, and for this reason it is the only subtest which is included for analysis in this section on the attainment of cognitive objectives.

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*This report was written by Mr. Brainard Hines of the Research and Evaluation Division.

METHOD

During the program year which began in September, 1969, and extended until June, 1970, a number of cognitive objectives from the Hooper-Marshall curriculum[1] were included in the primary objectives of the television program, Around the Bend, and in the related activities of the home visitor and van teacher.

To measure the achievement of these objectives, Part 2 of the Appalachia Preschool Test (APT) was administered in June, 1970, to a sample of 273 children in three treatment groups, and subsequently to a 60-child sample in a comparison group located in Morgantown, West Virginia. A more detailed description of sampling techniques is presented in the introduction to this report.

Part 2 of the APT is a 61-item test, developed by the AEL staff in early 1969, and administered in June of that year to a sample of approximately 125 children in order to measure cognitive development as of that time. It consists of a variety of tasks, with the following number of questions composing the total: vocabulary-15 questions; relational terms-14 questions; letter and number recognition-6 questions; mathematical sets-4 questions; geometric shape-4 questions; and beginning and ending sounds-8 questions, with the balance of the test devoted to body parts, calendar dates, and time related terms.

Each of the questions in Part 2 of the APT was derived from a corresponding objective which had been taught during the first year's programming (1968-69). The proportion of the various parts of the test to the

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[1]Frank H. Hooper and William H. Marshall, The Initial Phase of a Curriculum Development Project - Final Report (West Virginia University: Morgantown), August, 1968.

total instrument corresponds to the rank-ordering of the objectives taught throughout the year to the entire curriculum for that year.

It was hoped that the curriculum of the second year's programming would closely resemble that of the first year and that the APT could be used as a criterion referenced test for the second program year with no major revisions. Examination of the programs used during the second year, however, indicates that the instrument does not adequately measure the program's objectives and has now become instead a measure of general knowledge and reasoning ability.

ANALYSIS

Table 3-1 lists mean scores and standard deviations for each sex and cell within the three treatment groups and one comparison group.

These scores are combined for ages three, four, and five and both sexes in Figure 3-1, with means for each group represented graphically.

Inspection of these scores leads to several possible conclusions. First, any instance where the control group scored higher than the TV only group is very probably due to sampling or measurement artifacts rather than treatment effects. Although a negative treatment effect is theoretically possible, the likelihood of the television program's reducing program-related learning is minimal. Since this pattern is evident for the APT, the assumption is made that differences existed in other significant dimensions outside of viewing Around the Bend. Second, if the APT did measure specific learning, the effects of the ECE program were not additive. That is, the television, home visitor, and mobile facility did not contribute equally to the specific cognitive learning. For example, an increased APT score was not observed with the treatment group which had the mobile facility in addition to home visitors and the television program. Third, the ranking of treatments according to increased mean scores on the APT (TV-HV, pack-

age, control, and TV only) indicates that the program treatments were not additive. That is, the mobile facility and paraprofessionals did not add constant amounts of cognitive learning to the basic level which was associated with the television program.

TABLE 3-1

APPALACHIA PRESCHOOL TEST (PART 2) MEAN SCORES, STANDARD DEVIATIONS, AND SAMPLE SIZES BY AGE AND SEX WITHIN TREATMENT GROUPS

	Pkg.	TV-HV	TV Only	Comparison
3 M	$\bar{x}$ = 25.75 SD = 5.12 N = 8	$\bar{x}$ = 26.00 SD = 7.04 N = 9	$\bar{x}$ = 22.69 SD = 6.30 N = 13	$\bar{x}$ = 24.15 SD = 5.97 N = 13
3 F	$\bar{x}$ = 25.12 SD = 7.51 N = 8	$\bar{x}$ = 29.10 SD = 9.55 N = 10	$\bar{x}$ = 20.00 SD = 4.62 N = 10	$\bar{x}$ = 26.46 SD = 5.24 N = 13
4 M	$\bar{x}$ = 33.23 SD = 8.03 N = 13	$\bar{x}$ = 36.25 SD = 8.26 N = 8	$\bar{x}$ = 22.88 SD = 5.19 N = 8	$\bar{x}$ = 27.56 SD = 6.75 N = 13
4 F	$\bar{x}$ = 32.27 SD = 7.89 N = 11	$\bar{x}$ = 32.00 SD = 7.36 N = 10	$\bar{x}$ = 28.08 SD = 5.45 N = 13	$\bar{x}$ = 33.30 SD = 8.45 N = 10

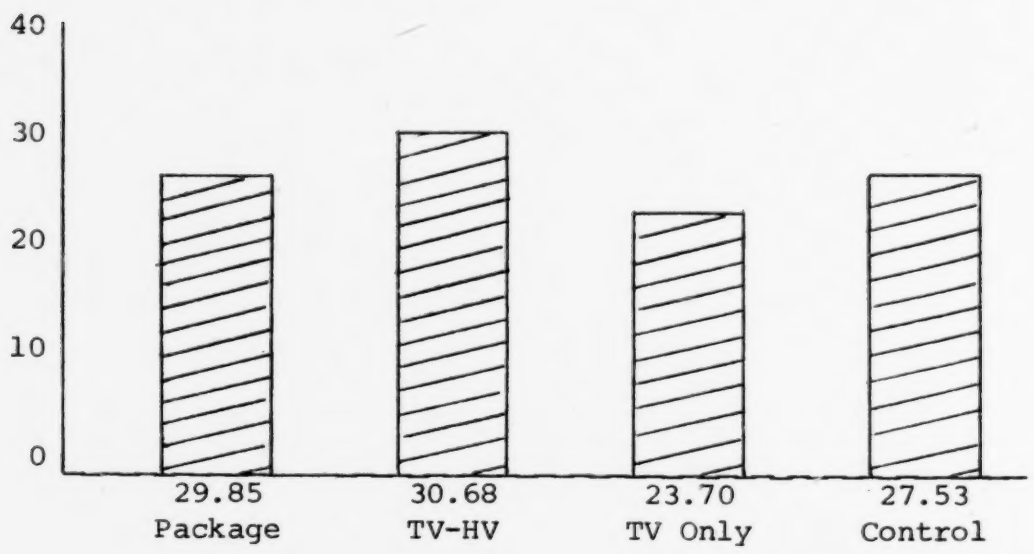

FIGURE 3-1

MEAN SCORES ON THE APT, PART 2 FOR ALL AGES AND BOTH SEXES BY TREATMENT GROUPS

A three-way analysis of variance procedure indicated ($P < .0005$) that a significant treatment effect existed. However, this inference resulted from the lower score for the TV only group, rather than a sequence of higher scores for all the treatment groups when compared with the control. A Scheffe post hoc comparison revealed that the TV only group scored significantly lower than the other two treatments but did not score significantly lower than the control group. The ANOVA table is reproduced in Table 3-2. An eta squared column is reported in the ANOVA table below indicating the percent of variance accounted for by each source in the table.

TABLE 3-2

ANALYSIS OF VARIANCE TABLE FOR THE APT, PART 2

Source	M^2	df	Mean Square	F	P
I(trt)	.118	3	404.5361100	5.50	< .0005
J(sex)	.004	1	38.39546158	0.8	
K(age)	.031	1	1340.437420	28.18	< .0005
IJ-INT	.015	3	51.35871108	1.08	
IK-INT	.006	3	20.55948195	0.43	
JK-INT	.001	1	8.328900431	0.18	
IJKINT	.030	3	101.7390063	0.18	
Error					

The significant age effect shown is probably due to the achievement test format of the instrument. That is, if the items are relevant to the child's fund of general knowledge and reasoning ability, we would expect large increases with the passage of time. This is the case for the 1970 ECE sample across all treatment groups.

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A correlation matrix between Part 2 of the APT and the other instruments in the test battery is shown below. It provides further evidence for the general nature of the test.

TABLE 3-3

PEARSON r CORRELATIONS BETWEEN APT PART 2 AND OTHER TESTS

Age in Months	Frostig Total Score	PPVT Raw Score	PPVT M.A.	PPVT IQ	ITPA Total	APT 1
.45	.68	.63	.63	.50	.73	.60

N = 150 (approx.)

Although it is possible that the factorial impurity of the APT is responsible for this series of relatively high intercorrelations, it is more likely that the test is measuring a factor common to the entire battery (see Technical Report No. 6) rather than the specific cognitive learning for which it was designed.

Analysis of covariance (ANCOVA) routine, using chronological age and PPVT raw score as covariates, was performed on the results of Part 2 of the APT. The ANCOVA provided no new information beyond that already obtained from the analysis of variance.

INTERPRETATION OF RESULTS

It is difficult to make any inferences about the effectiveness of the program in teaching specific cognitive objectives from the results of the APT. Although some lessons from the first year's programming have been included in the second years' efforts, few of these programs' objectives correspond to questions on the APT.

For this reason it does not seem proper to use the APT as the major criterion for program effectiveness. Success of the program was arbitrarily defined as achievement by children with IQ's of 90 and above of 90 percent of the objectives taught throughout the program year.[2] Computation of a "success" estimate for the second year would produce a figure that was spuriously low, since we would be measuring only a small portion of what was taught during the year. An effort is currently being made to revise the APT to include all the cognitive objectives which have been taught throughout the entire three-year course of program development. When that instrument is available, we will be able to make a valid and reliable judgment of the program's success in teaching a set of cognitive objectives, and of the true effects of each of the program components in enhancing that learning.

At present, a few major conclusions can be drawn from the available data. The effects of the television program, paraprofessional, and mobile facility, insofar as they are reflected in the APT, are not equally important in bringing about the achievement of specific cognitive learning.

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[2]The Laboratory, Evaluation Report: Early Childhood Education Program, 1969 Field Test (Appalachia Educational Laboratory: Charleston, West Virginia), March, 1970, Appendix F, p. 14.

This is not surprising since the home visitor more than any other part of the program has a great potential for influencing the child's behavior. Any changes which she can produce in the home environment will be magnified in their effects on the child, since they will be more permanent and important in his life than exposure to the television program or mobile facility.

The children who view Around the Bend and are not exposed to any of the other components do score significantly lower than those who receive the other treatments. The TV only group, although located geographically near the other two treatments, contains a higher percentage of rural families who are consequently somewhat deprived in their home environment. An alternative, and less likely hypothesis, is that the television program produces a negative treatment effect and thus reduces the scores of all three groups which receive that program component. No support exists in the current data for this contention.